



Industrial Water Solutions

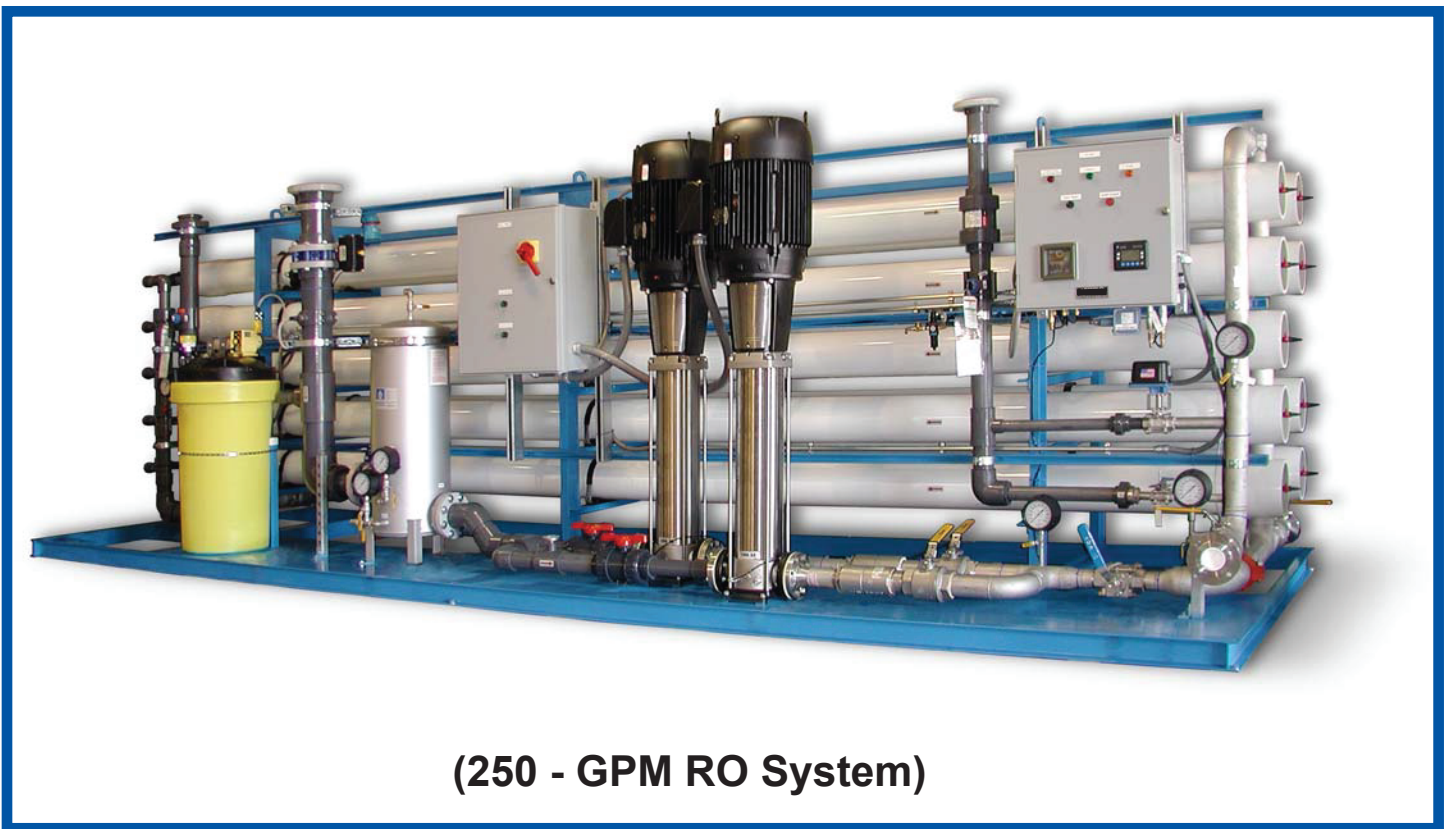
NRO-8H Series



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# INDUSTRIAL REVERSE OSMOSIS SYSTEMS

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**(250 - GPM RO System)**

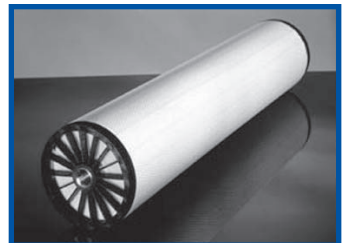
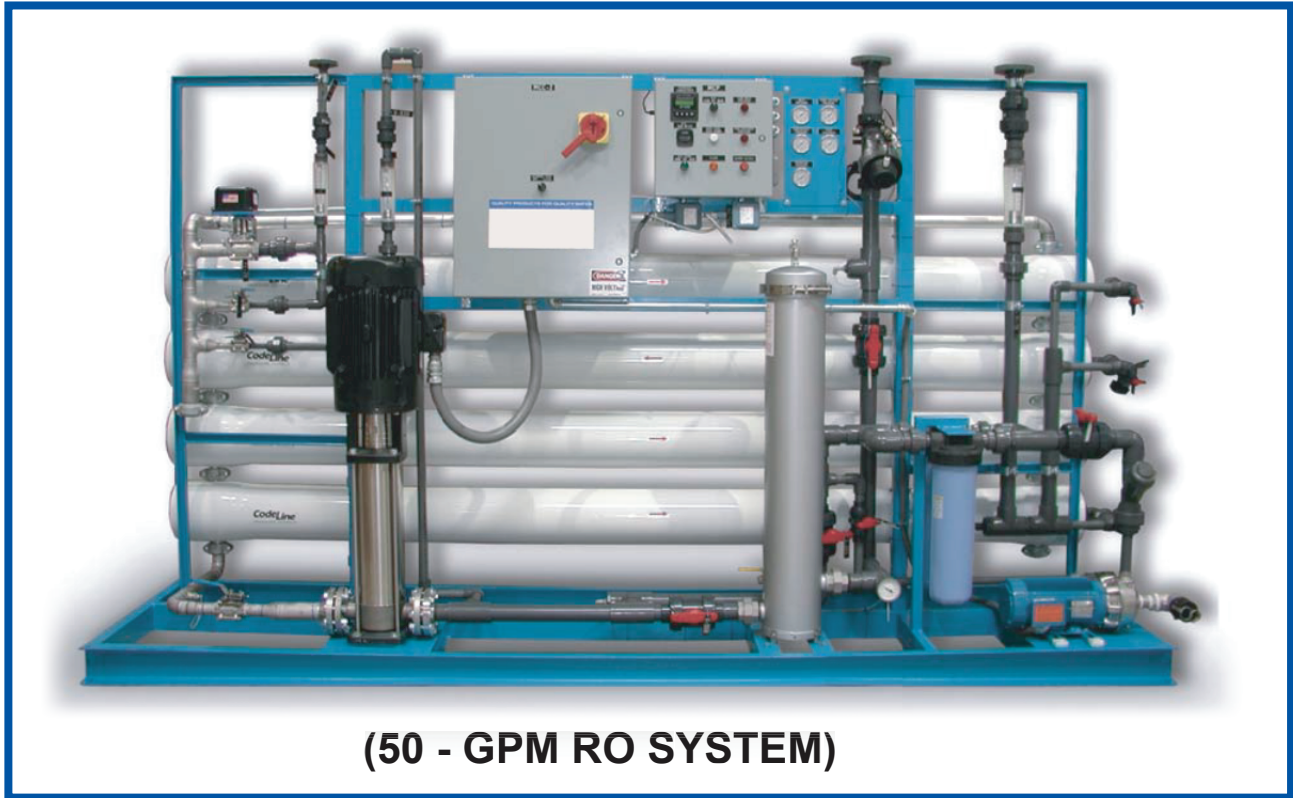
► **Industrial Reverse Osmosis**



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## PRODUCT OVERVIEW

The NRO-8H Series Industrial Reverse Osmosis Systems are engineered to economically produce high purity water by removal of dissolved minerals, bacteria, particles, and organic impurities. Each NRO machine is constructed using the highest quality components and materials for reliable operation and exceptional performance. Our standard machines are available with product water outputs from 25-200 GPM (36,000-288,000 GPD). Contact the factory for larger flow rate requirements.

We also offer a wide variety of machine options, pre/post treatment equipment, distribution pumps, and integrated controls for a complete water treatment system. Our specialty is skid mounted, pre-piped, and pre-wired equipment allowing for quick installation and start-up time. Other types of membrane technology are also available including two-pass, cellulose acetate (CA), nanofiltration (NF), and ultrafiltration (UF) for custom applications. Our engineers are ready to work with you to design a system meeting your water treatment requirements.

The following are just a few of the industrial applications that benefit from the use of reverse osmosis water:

- Boiler Feedwater
- Chemical Manufacturing
- Metal Plating / Finishing
- Ice-Making
- Bottled Water

- Small Municipalities
- Electronics Manufacturing
- Ink / Dye Production
- Food / Beverage Production
- Deionizer Pre-Treatment

# Designed for Performance

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## SYSTEM FEATURES

### Skid and Frame Assembly

All membrane systems are manufactured in a skid / frame design providing for ease of installation with minimum floor-space requirement. Constructed of welded structural carbon steel tubing, finished with corrosion resistant epoxy paint coating. Stainless steel fastener hardware is standard for corrosion resistance.

### Cartridge Pre-Filtration Vessel

Pre-filtration of the membrane feed is standard on all systems. Filter housing is constructed of 304 stainless steel. Filter cartridges are pure polypropylene with a 5.0-micron nominal rating.

### System Pressure Pump

Standard pressure pumps are constructed with a 304 / 316 stainless steel housings and impeller / diffuser stage assemblies. Pumps are equipped with TEFC motors wired for 230 / 460 VAC voltage and rated for full load, continuous duty.

### Membrane Pressure Vessels

All systems feature membrane pressure vessels constructed of fiberglass reinforced polyester (FRP) with 316 stainless steel side-entry feed / concentrate ports. Standard vessels have a white polyurethane finish. Operating rating of pressure vessels is 400 psig. Higher pressure ratings and ASME code-stamping is available on all pressure vessels.

### Membrane Elements

Standard reverse osmosis (RO) membrane elements are high rejection, thin-film composite (TFC) type in a spiral-wound configuration. Membrane elements are tested at 99.5% average salt rejection. All membrane elements carry a three-year warranty against defects in quality and workmanship.

### Instrumentation

All systems feature a complete instrumentation package for optimal performance monitoring. Each of the following instruments are completely panel-mounted and pre-wired:

- Pre/Post cartridge filter pressure gauges
- RO feed/interbank pressure gauges
- Product/reject pressure gauges
- RO inlet/pump discharge pressure switches
- Product/reject electronic flow meters
- Product conductivity monitor
- System temperature indicator
- Pump run hour meter

### System Control

Operations of the system are automatically controlled through a comprehensive programmable logic controller (PLC) package housed in a NEMA-4 industrial electrical enclosure. The control system also includes a pre-wired motor starter, operator switches / pushbuttons, and status / alarm indicator lights. Standard systems include the following isolated alarm conditions:

- Low inlet pressure
- High pump discharge pressure
- High RO product conductivity

### System Piping and Valves

All membrane systems are completely pre-piped to the fullest extent and installation ready. Schedule 80 PVC is standard material for all piping and valves under 75 psig operating pressure. Higher pressure piping and valves are constructed of 304 stainless steel using. The following valves are provided as standard for accurate flow/pressure control and convenient operation:

- Automatic inlet valve to prevent water flow through machine during shutdown
- Pressure pump discharge throttle valve
- RO reject/recirculation flow control valves
- Automatic system flush valve for prevention of membrane fouling and scale formation
- Pre/Post cartridge filter housing isolation valves
- Inlet, product, and reject sampling valves
- Individual membrane housing product sampling valves.
- Isolation valves and blind ports for use with membrane cleaning systems

## SYSTEM OPTIONS

### Machine Hardware

- 304 stainless steel skid and frame assembly
- 316 stainless steel pre-filter housing
- 316 stainless steel high pressure piping / valves
- Premium efficient pressure pump motor

### Instrumentation

- Digital inlet feed-water pH monitor/controller
- Digital inlet feed-water ORP monitor/controller
- Inlet feed-water hardness monitor
- Inlet feed-water turbidity monitor
- Silt Density Index (SDI) test assembly
- High RO product pressure alarm / shutdown
- RO product divert valve
- Touch-screen operator control monitor

### RO Product Storage and Distribution Systems

- FRP and HDPE storage tanks with level controls
- Repressurization pumps and controls

### Pre-Treatment Systems

- Multi-media filters
- Activated carbon filters
- Water softener systems
- Inlet feed-water pH adjustment chemical addition
- Inlet feed-water anti-scalant chemical addition
- Inlet feed-water dechlorination chemical addition
- Inlet feed-water heat exchanger systems

### Post-Treatment Systems

- Two-bed and mixed-bed deionization
- UV sterilization
- Polishing cartridge filter housings

### Membrane Cleaning and Maintenance

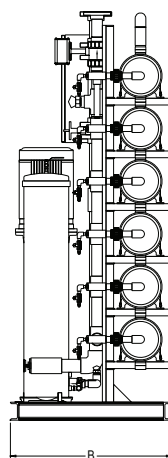
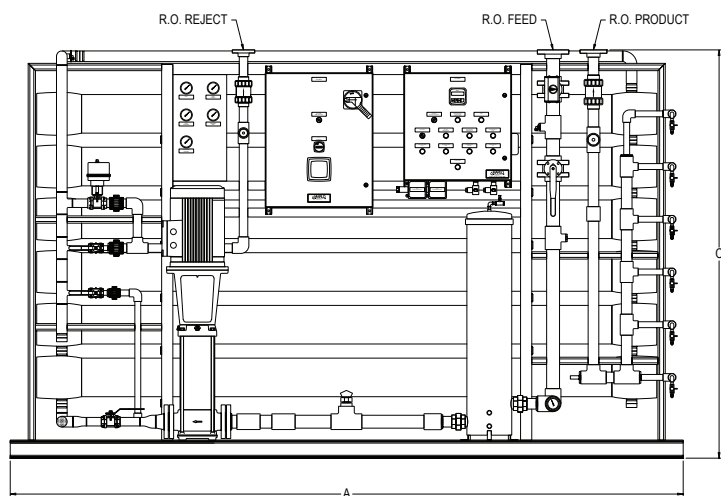
- Skid mounted membrane Clean-In-Place (CIP) systems
- RO product water membrane flush system
- RO system performance evaluation software.

## SPECIFICATIONS NRO-8H SERIES

Model No.	Design Capacity		Element Quantity	Vessel Staging	RO Feed (gpm)	RO Reject (gpm)	System Piping Connections			Operating Pressure	Pump Hp	Approx. Ship Wt.
	(gpm)	(gpd)					Inlet Feed	Permeate	RO Reject			
NRO-36K-8H	25	36,000	6	1/1	31-33	6-8	1 1/2" Flg.	1 1/2" Flg.	1" Flg.	250 psi	10 HP	3000 lb.
NRO-50K-8H	35	50,400	9	1/1/1	44-47	8-12	2" Flg.	1 1/2" Flg.	1" Flg.	240 psi	15 HP	3300 lb.
NRO-72K-8H	50	72,000	12	2/1/1	62-67	12-17	2" Flg.	2" Flg.	1" Flg.	250 psi	20 HP	3500 lb.
NRO-94K-8H	65	93,600	16	2/1/1	81-87	16-22	2 1/2" Flg.	2" Flg.	1 1/2" Flg.	250 psi	25 HP	3900 lb.
NRO-115K-8H	80	115,200	20	2/2/1	100-107	20-27	2 1/2" Flg.	2 1/2" Flg.	1 1/2" Flg.	250 psi	25 HP	4100 lb.
NRO-144K-8H	100	144,000	24	3/2/1	125-133	24-32	2 1/2" Flg.	2 1/2" Flg.	1 1/2" Flg.	250 psi	30 HP	4500 lb.
NRO-180K-8H	125	180,800	30	3/2	156-167	31-42	3" Flg.	3" Flg.	2" Flg.	240 psi	40 HP	4900 lb.
NRO-216K-8H	150	216,000	36	4/2	175-187	35-47	3" Flg.	3" Flg.	2" Flg.	240 psi	50 HP	5100 lb.
NRO-252K-8H	175	252,000	42	4/3	200-213	40-53	4" Flg.	3" Flg.	2" Flg.	240 psi	50 HP	5500 lb.
NRO-288K-8H	200	288,000	48	5/3	250-267	50-67	4" Flg.	4" Flg.	2" Flg.	255 psi	60 HP	5900 lb.
NRO-324K-8H	225	324,000	54	5/4	281-300	56-75	6" Flg.	4" Flg.	3" Flg.	255 psi	2 @ 40 HP	6600 lb.
NRO-360K-8H	250	360,000	60	6/4	313-333	63-83	6" Flg.	4" Flg.	3" Flg.	255 psi	2 @ 40 HP	7300 lb.

\* Contact factory for flow rates beyond 250-gpm.

## OVERALL SYSTEM DIMENSIONS



Model No.	Length*		Height
	A	B	
NRO-36K-8H	146"	40"	82"
NRO-50K-8H	146"	40"	82"
NRO-72K-8H	146"	40"	82"
NRO-94K-8H	194"	46"	82"
NRO-115K-8H	194"	46"	82"
NRO-144K-8H	194"	46"	94"
NRO-180K-8H	274"	50"	86"
NRO-216K-8H	274"	50"	94"
NRO-252K-8H	274"	60"	86"
NRO-288K-8H	274"	70"	86"
NRO-324K-8H	274"	76"	86"
NRO-360K-8H	274"	76"	86"

## OPERATING PARAMETERS

- Operating Pressures: 240 – 255 psig (at projected 3 yr. membrane age)
- Minimum system inlet feed pressure: 30 psig
- Operating temperature range: 50 – 80° F. (10 – 27° C.)
- Maximum inlet free chlorine: <0.1 ppm
- Maximum inlet silt density index (SDI): 3.0
- Standard electrical power: 460 VAC, 3-phase, 60 Hz.
- Nominal system TDS reduction: 95% – 99%
- Nominal system overall recovery rate (product/feed): 75% – 80%
- Projected performance and operations based on inlet feed of 2000 ppm TDS.

\* Requires minimum of 45" additional length on each side of the skid for membrane installation or removal.



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